

REMARKS

Claims 1-24 are pending in the application; the status of the claims is as follows:
Claims 4-7, 11-14, 16, and 20-22 are withdrawn from consideration; and
Claims 1-3, 8-10, 15, 17-19, 23, and 24 are rejected under 35 U.S.C. § 103(a) over JP(A) 05-100179 ("JP '179") in view of JP(A) 07-050401 ("JP '401").

35 U.S.C. § 103(a) Rejection

The rejection of claims 1-3, 8-10, 15, 17-19, 23, and 24 under 35 U.S.C. § 103(a), as being obvious over JP '179 in view of JP '401, is respectfully traversed based on the following.

Addressed first is the rejection of claim 1 and claims 2, 3 and 23 which depend from claim 1. As discussed in previous responses to office actions in this matter, the claims of the present patent application are directed to various image pickup devices and to input optical systems for use with image sensors. An objective in the pending claims is to provide a system that directs light onto the sensing region of the sensor while reducing light incident on an image sensor outside of the sensing region of the sensor.

This concept can be seen in claim 1, which recites:

An image pickup device comprising:
 an image sensor having rectangular light receiving portions arranged in a matrix, and microlenses disposed in correspondence with said light receiving portions, said light receiving portions and said microlenses being formed integrally with each other; and
 an image input optical system for forming an image on said image sensor, said image input optical system including a diaphragm;
 wherein the diaphragm has a shape in a vertical direction that coincides with a shape of said light receiving portions of said image sensor, said diaphragm restricting light along a horizontal direction to prevent the light from being incident outside the light receiving portions of the image sensor, and said diaphragm and the light receiving portions of

said image sensor are in a conjugate relationship.
(emphasis added)

Thus, as seen above, the invention of claim 1 achieves this objective by a particular structure which is set forth by the claim. Specifically, claim 1 requires an image sensor that includes microlenses formed integrally with the light receiving portions of the image sensor. Claim 1 also requires an input optical system including a diaphragm which is configured in a way to be in conjugate relationship with the light receiving portions of the image sensor.

Neither the JP '179 nor JP '401, singly or in combination, disclose or suggest the limitations of claim 1.

In particular, contrary to the suggestion in the Office Action, the JP '179 does not disclose or suggest that the aperture 3 is in a conjugate relationship to an image sensor. This can be understood for two reasons. First, the JP '179 does not disclose any particular configuration of image sensor, much less one having a particular configuration of light receiving portion. Other than an off hand remark in paragraph 12, the CCD is not discussed. More particularly, the JP '179 does not disclose or suggest that the optical system would have a conjugate relationship between the aperture or any image sensor.

The term conjugate relationship has a special meaning in optics – not merely “connected” as the Office Action suggests. Instead, the conjugate relationship is a physical relationship such that an image of the object is formed by the optical system on the image plane. This can be understood, for example, from the following tutorial:

http://www.mellesgriot.com/products/machinevision/lef_3.htm

Claim 1 (as well as claims 8, 15 and 18) require that the diaphragm (aperture) and the light receiving portion of the image sensor are in a conjugate relationship. This requirement means that an image of the diaphragm (aperture) will be formed by the

microlenses at each of the light receiving portions. For example, in the first embodiment, the image input optical system makes a conjugate relationship between the photographic subject and the light receiving portion, and the microlenses make a conjugate relationship between the diaphragm and the light receiving portions.

In contrast, in the JP'179, the diaphragm and the image sensor are not in a conjugate relationship. Instead, the image surface 4 and the image sensor 5 may be in a conjugate relationship, however, the diaphragm is for removing a flare caused by the rotating prism and need not be in a conjugate relationship.

The JP'401 also fails to disclose or suggest the limitation of the claimed invention. JP'401 does not teach a conjugate relationship between the diaphragm and the light receiving portions.

In order to render obvious the invention of claim 1, the references, singly or in combination, must disclose or suggest every limitation of the claim. Because neither the JP'179 or the JP'401 disclose or suggest this limitation, the references are unable to render obvious the invention of claim 1, or claims 2, 3 and 23, which depend therefrom.

Addressed next are the rejections of independent claims 8, 15 and 17 together with the claims that depend there from.

Like claim 1, each of claims 8, 15 and 17 require a conjugate relationship between the diaphragm (or light controlling means) and the light receiving portions of the image sensor. For example, claim 8 requires, *inter alia*:

wherein said diaphragm is positioned so that said diaphragm and light receiving portions of said image sensor, positioned with respect to said image input optical system to have an image formed thereon, are in a conjugate relationship.
(emphasis added)

Similarly, claim 15 requires, in part:

wherein the diaphragm has a shape that coincides with a shape of said light receiving portions of said image sensor, said diaphragm restricting light along a direction perpendicular to the direction along which said charge transferring portions of the image sensor are positioned to prevent the light from being incident on the charge transferring portions of the image sensor, and said diaphragm and the light receiving portions of said image sensor are in a conjugate relationship.
(emphasis added)

Similarly, claim 17 requires, in part:

wherein the light controlling means has a shape in a vertical direction that coincides with a shape of said light receiving portions of said image sensor, said light controlling means restricting light along a horizontal direction to prevent the light from being incident outside the light receiving portions of the image sensor, and said light controlling means and the light receiving portions of said image sensor are in a conjugate relationship.
(emphasis added)

Thus, each of the remaining independent claims requires that the diaphragm (light controlling means) is in a conjugate relationship with the light receiving portions of the image sensor.

As discussed above with respect to claim 1, neither the JP'179 or the JP'401 disclose or suggest a conjugate relationship between the diaphragm and the light receiving portions. In order to render obvious the invention of claims 8, 15 or 17, the references, singly or in combination, must disclose or suggest every limitation of the claims. Because neither the JP'179 or the JP'401 disclose or suggest this limitation, the references are

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unable to render obvious the invention of claim 8, 15 or 17, or claims 9-10, 18-19 and 24, which depend therefrom.

Accordingly, in view of the foregoing, it is respectfully requested that the rejection of claims 1-3, 8-10, 15, 17-19, 23, and 24 under 35 U.S.C. § 103(a) as being unpatentable over JP '179 in view of JP '401, be reconsidered and withdrawn.

In view of the foregoing remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance respectfully requested.

This Amendment does not increase the number of independent claims, does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin LLP Deposit Account No. 18-1260.


If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee,

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and not submitted herewith should be charged to Sidley Austin LLP Deposit Account
No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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July 12, 2006

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